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(54) **Method and system for monitoring the status of articles, particularly in warehousing.**

(57) A method and system for monitoring the status of articles, particularly in a warehousing system in which stored articles are to be picked and sorted for despatch. The system includes a distribution audit system computer (32) which receives batch picking information on a recording medium (23) identifying each transaction or article to be picked with a unique number. Associated with each unique number is processing information for controlling the sorting of the article within the system. The same number, unique for each article, is contained on a label (20) positioned on each article as it is picked. Computer control means (60) provides continuous monitoring of the article as it is scanned by one or more label reading devices (44, 46) such that the picking and sorting status of each article to be picked can be continuously monitored. The system includes an operator interface terminal (40) and printers (36, 38) for providing a variety of status reports to the operating personnel such that the operational status of the system can be continuously monitored.

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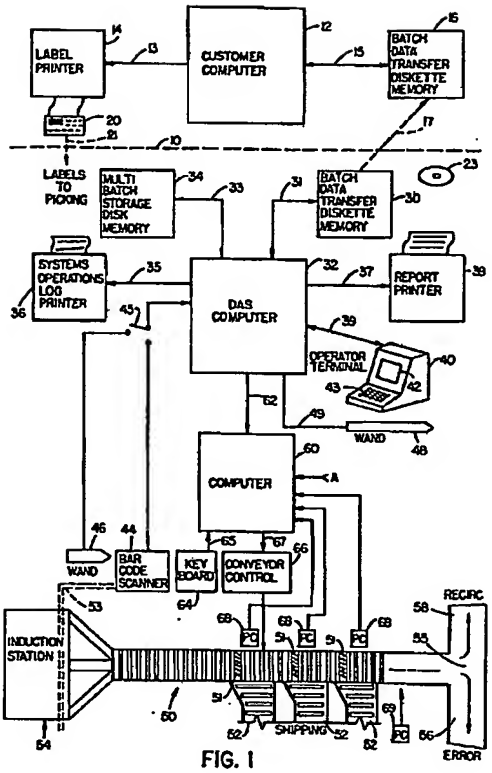
LABEL PRINTER
CUSTOMER COMPUTER
BATCH DATA TRANSFER DISKETTE MEMORY
LABELS TO PICKING
MULTI BATCH STORAGE DISK MEMORY
BATCH DATA TRANSFER DISKETTE MEMORY
SYSTEMS OPERATIONS LOG PRINTER
DAS COMPUTER
REPORT PRINTER
OPERATOR TERMINAL
WAND
COMPUTER
WAND
BAR CODE SCANNER
KEY BOARD
CONVEYOR CONTROL
INDUCTION STATION
RECIRC
SHIPPING
ERROR

FIG. 1

METHOD AND SYSTEM FOR MONITORING THE STATUS OF ARTICLES, PARTICULARLY IN WAREHOUSING

This invention relates to a method and a system for monitoring the status of articles being processed, particularly of articles being moved through a picking and sorting operation in a warehouse.

There exists a great variety of systems in which orders are filled by, for example, a central warehouse where items to be shipped to a given destination are manually, semiautomatically, or automatically picked, sorted, and routed to a despatch or shipping dock for shipment to, for example, retail stores. Typically, labels identifying the shipping destination are applied to articles as they are picked which labels are subsequently employed at a sorting location for the diverting of articles to a particular shipping area of the installation. United States Patent No. 4,181,947 illustrates a sorting system which can be employed with such a system.

Where, however, a warehouse system is of relatively large size and it is capable of simultaneously handling a great number of orders, maintaining accurate information as to the status of individual orders being filled as well as the operational status of the entire system, while maintaining a maximum throughput efficiency, is virtually impossible with the systems of the prior art.

It is an object of the present invention to provide a method and apparatus for maintaining an accurate account of each transaction occurring within a warehousing system such that at any given time during an operating

day, the status of each transaction and order being filled can be monitored and controlled.

According to one aspect of the present invention, a method of monitoring the operational status of an article processing operation comprises the steps of: assigning an identification number unique to each article to be picked and sorted; supplying a plurality of labels, each label including a different one of the unique identification numbers; applying one of the labels to each article to be picked and sorted; storing data corresponding to each article including the unique identification number and the sort destination; reading the label on each article as it is inducted onto a sorting line; correlating information from the reading step with the stored data to control the sorting of each article to an assigned discharge location coupled to the sorting line; and selectively providing updated information as to the status of each article in the system as a result of the reading and correlating steps.

According to another aspect of the present invention, a system for monitoring the status of articles being processed comprises: means for storing data representing each article moving within the system, the data including a number assigned to each article which is unique to each article; scanning means for scanning indicia including the unique number on an article being processed; computer circuit means coupled to the data storing means and to the scanning means for correlating position information of each article with the article identification number; and display means coupled to the computer circuit

means for providing display information to an operator of the status of articles or groups of articles in the system.

Thus each transaction, which in the preferred embodiment of the invention pertains to a given article to be transferred from storage to a dispatching area, is assigned a unique identification number. This number is subsequently applied to an article as it is picked in the form of a machine readable coded label. The number is also entered into a control system memory, and as the article travels through the system, the label is read such that at any given time, the status of each transaction and the operation of the entire system is accurately known and can be controlled.

In the preferred embodiment of the invention, the system incorporates a computer controlled sorting and control system in which each article to be removed from storage and shipped to a destination is assigned a unique code which identifies a single transaction within the system. Orders to be filled by batch picking and transfer of articles from storage to a given dispatch location at the warehouse are grouped together in the computer memory to form batches of orders with the customer identification and discharge location being associated with each transaction number. By reading only the transaction number from an encoded label on an article at one or more locations within the system, the computer can continuously update the order status information and provide the operators of the system with current status information as well as provide control

information to the sorting system employed. By providing operator interface circuits, reports can be generated either in soft or hard copies to monitor the operational status of each transaction, order or batch of orders to facilitate the accurate and fast movement of articles within the system. Such information can be employed to quickly identify and correct failures and breakdowns within the system or to rapidly reassign divert locations for the sorting system in the event of a breakdown of a sortation line.

Other features of the invention are set out in the subsidiary claims and their advantages will become apparent from the following description of a preferred embodiment.

The invention may be carried into practice in various ways but one warehousing system and a method of monitoring the system in accordance with the invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a pictorial representation of the warehousing system and including in block form an electrical circuit diagram of the control system;

Figure 2 is a typical label associated with each article and identifying a unique transaction within the system; and

Figure 3 is a typical order report showing the status or orders in the system.

Figure 1 represents a physical installation as well as the control system located within the installation. At the upper portion of the figure above dashed line 10

there is shown a central control area corresponding typically to an office area of a customer's facility, while the portion below line 10 represents the actual warehouse installation including the sortation conveyor equipment, and in which the actual articles to be transferred from storage to a dispatching dock or the like are stored in a conventional warehousing storage system. Such a system may include, for example, tiers of vertically and horizontally arranged storage bins with access aisles extending between adjacent tiers permitting either manual, sem-automatic, or automatic picking of articles from the storage bins to be achieved through the use of stacker cranes or other picking systems. Articles removed from storage are placed on conveying systems which ultimately connect with a sorting conveyor. Not shown in Figure 1 are the storage bins, access aisles, or the conveyors leading to the induction station and sorting conveyor system. In some installations, the warehouse will be physically separate from the central control area while in other installations the two locations may share a common building at separate areas. Having briefly described the environment in which the present invention pertains, a description of the overall system is now presented.

In Figure 1, the customer computer 12 typically will be a relatively large computer used by the customer for all of its business operations. Such a computer may be, for example, a commercially available IBM System 3 type computer which is interfaced with a label printer 14 by means of a data link 13 for the printing of labels

20, such as shown in Figure 2. The label printer can be any one of a number of dot matrix-type printers which are commercially available such as the Printronix Model 600. Also, interfaced with the customer computer 12, is a batch data transfer diskette memory 16 coupled to the computer by a data line 15 for the generation of diskettes containing information corresponding to one batch of orders. The unit 16 may be, for example, a commercially available IBM floppy diskette model 3540. The customer computer 12 is employed in connection with label printer 14 and diskette unit 16 through conventional programming techniques to arrange orders to any one of the several retail outlets of the customer in a logical picking sequence such that the articles can be batch picked. Thus, for example, if the customer is a large grocery chain, with several grocery stores located in the geographical area served by the warehouse, one batch of orders to be filled may include fifty different grocery items with the batch including orders for fifteen different retail outlets. The orders are arranged such that each item which is common to the group of articles to be picked will be simultaneously picked by the warehousing picking system. Thus, the computer 12 will be programmed, for example, to print labels in order with all of the labels for example, pertaining to a case of a certain type of produce such as beans to be simultaneously picked for all of the orders. This organisation provides for efficient batch picking of articles.

Assigned to each transaction, which corresponds to a single case of a given item, is a unique six digit number

which is employed within the control system shown in Figure 1, to uniquely identify that article such that its progress within the system can be monitored and controlled. This number is applied in machine readable form to the label 20 as seen in Figure 2 in the form of a bar code 22 which occupies a large portion of the label. The label 20 also includes man readable information 24 at the bottom of the label indicating for example the product identification, pricing information, and shipment location for the customer to which the article being picked is to be transferred. Further, the label will include man readable indicia 25 indicating the storage location of the article within the warehousing system which is contained within the memory of computer 12. Also on label 20 is indicia 26, corresponding to the store number to which the article is to be shipped, indicia 27 showing the unique six digit number (which in the example shown in Figure 2 is the number 254789); and finally, indicia 28 pertaining to the discharge chute of the sortation conveyor system to which the article is to be sent for shipment.

Each article to be picked corresponding to a single transaction thus receives a label 20 and each label printed by printer 14 in a given day has a unique number 22 as compared to all other labels printed. Information corresponding to the label information as well as additional information is simultaneously recorded on a floppy diskette by unit 16 which includes the label information for a plurality of labels forming several orders forming, in turn, a single batch for processing within the control system.

Each diskette therefore includes stored data corresponding to each label of a given batch including the six digit label number, the sort lane number, the store number, the product code, which is assigned by the customer to any particular type of product, and information pertaining to where the product is stored in the warehouse. Further, each diskette includes a header record which provides an identification of the particular batch, as well as a description of the batch which can be any fifty character description desired by the customer. Thus, each group of labels provided by printer 14 will have associated with it a single diskette corresponding to a batch of items to be picked. Each batch will typically include several orders, each of which will include several transactions with each transaction having a single label associated with it. The system being described is capable of processing simultaneously up to 10 batches with each batch having a capability of thirty five orders per batch and a total of 9,000 transactions for each batch. Typically, however, only one or two batches will be picked simultaneously with the remaining batch information contained in memory in either a pending status or possibly a completed status, depending upon the operational status of the picking and sorting of the batches. The generation of the labels, as well as of the diskette in a batch picking sequence, with the exception of the utilization of a unique number assigned to and associated with each label and transaction is conventional and achieved by the computer 12. The labels are manually carried to the warehouse as indicated by dashed line 21 as are the diskettes

23 generated and associated with each batch as indicated by dashed line 17.

Each diskette from the customer computer 12 generated by the diskette unit 16 is read by a batch data transfer diskette memory unit 30 associated with and coupled to a distribution audit system (DAS) computer 32 by means of a data link 31. The diskette unit 30 may comprise for example a commercially available IBM diskette unit model number 4964, while computer 32 may for example be an IBM model 4955D computer. The function of unit 30 is to read the information from the diskette hand-carried from unit 16 into a multi-batch storage disc memory unit 34 coupled to computer unit 32 through a data line 33. Unit 34 is capable of storing not only the control program for computer 32, but also the data stored on each of the diskettes associated with each batch of articles to be picked. Unit 34 may, for example, comprise a commercially available IBM 4962 disc storage unit. Hard copies of alarm, status, and control information are provided by a systems operations log printer 36 coupled to computer 32 by means of a data link 35. Printer 36 may, for example, comprise a Digital Equipment Corporation matrix printer type LA 120. A second report printer 38 is also coupled to computer 32 through data link 37 and is employed for providing a variety of status reports as discussed below and may be for example an IBM model 4974 matrix printer. Also coupled to computer 32 by means of a data link 39 is an operator terminal 40. Terminal 40 includes a CRT display 42 and a digital keyboard 43 and may be a commercially available IBM model 4979 display

station. Several such operator terminals and printers may be positioned at different locations within the system as conveniently desired. Other interface inputs to the computer 32 include one or more bar code scanners 44 selectively coupled to the computer 32 by means of a switch 45 which either couples the scanners 44 which are Accusort model number M scanners to an input of computer 32 or label wand scanners 46 to the computer 32. The wand scanners 46 can be Accusort model number 4600 scanner for detecting the bar code 22 on labels 20 of Figure 2. Scanners 44 optically read labels on articles prior to transfer or induction onto the sortation conveyor 50 as shown by lines 53 in Figure 1. Also coupled to computer 32 by means of a data line 49 is a second wand scanner 48 which is employed for scanning stockout labels as described below and which can also be an Accusort model 4600 wand scanner. An additional wand scanner (not shown) is employed for hand scanning excess repack labels as also described below.

The DAS computer 32 interfaces with a programmable sort control (PSC) computer 60 by means of a data interface coupling 62. Associated with the PSC computer 60 is a backup keyboard 64 coupled thereto by means of a serial data link 65, and a conveyor control circuit 66 coupled thereto by means of a data line 67. A plurality of article detecting photo cells 68 are spaced along the sorting conveyor 50 respectively downstream of a plurality of article diverters 51 for detecting whether an article has been properly diverted to its assigned discharge or shipping chute 52 associated with the sorting conveyor

50. Further, a line full photo cell detector 69 is also coupled to the PSC computer 60 and is associated with each of the discharge chutes 52 such that a control signal is applied to computer 60 in the event any of the discharge chutes are filled with articles and thereby requiring a different discharge chute to be assigned to a particular order being sorted and staged for shipment.

At the input end of the sorting conveyor 50, there is provided an induction station 54 for receiving articles from several feeder conveyors (not shown) extending throughout the warehousing system and converging the articles onto the sorting conveyor 50. The PSC computer and its associated interface and control circuits to provide the induction and sorting of articles is described in detail in the above identified United States Patent No. 4,181,947.

Sorting conveyor 50 terminates in a T 55 leading to either an error chute 56 or a recirculation loop 58 such that articles not sorted can either be recirculated through the sortation control system as selectively controlled as described below or fed to a storage area associated with the error chute for manual attention to a nonreadable label.

The control of the hardware elements shown in Figure 1 corresponding to the control system of the present invention is achieved by the programming of computer 32 which program is stored in memory 34 and achieves the desired monitoring and control of each transaction. The programming can be achieved by one skilled in the

art. Its exact form will naturally depend on the hardware used. Having described the hardware, a description of the operation of the system to achieve the desired monitoring and control of each transaction as well as the various status reports available employing the unique transaction number identification of each article to be picked, is now presented.

Before any of the articles to be picked can be recognized and sorted by the DAS control system, the batch and transaction information must first be transferred to the DAS system. This is achieved by the operator control terminal 40 entering a READ command which transfers the information from a diskette 23 placed in unit 30 into the computer memory 34. Once the data base has been constructed by the operator for each of the diskettes being processed during a day's operation, the actual picking, sorting, and monitoring functions available are commenced by a START command which changes the batch status from pending to active and enables the DAS computer to sort the product.

The picker applies labels to the correct products and places the label containing the unique six digit bar code on each article as it is picked and transferred onto a conveyor within the system which feeds to the induction station 54. Each article is scanned by scanner 44 for its unique number and this information is supplied to the DAS computer which correlates it with sort location information for that number, and communicates with the PSC computer the sort destination assigned to the particular transaction. Depending upon the selected mode

of operation, the article can be stopped and hand wanded by wand 46, recirculated through recirculation loop 58 or shunted into the error chute 56 upon failure of scanner 44 to read the article's number. The status of the article is changed from "not-picked" to "in-sortation" and the PSC performs the physical sorting of the article and informs the DAS computer of the actual status of the package on the sorting conveyor. When the label is transferred to its assigned destination chute 52, (Figure 1) the status of the article is changed from "in-sortation" to "staged for shipment". If the article is unable to sort to its assigned sorting lane, the PSC informs the DAS of the actual disposition of the package.

Once all of the articles of a batch have been picked and sorted, including articles for several different orders typically, the operator, who monitors the progress of the batch picking as described below, enters an END command in the operator terminal 40 which changes the batch status to "complete". At this time, the operator can enter a WRITE command in terminal 40 which generates a new diskette which is returned to the customer computer and which has information as to the completed status of each transaction in the batch which can be employed by the customer for inventory, billing, and other functions such as the printing of shipping manifests and other documents. Once the batch has been processed by the DAS control system, it can be deleted from the DAS data base memory unit 34 by entering a DELETE command.

There are a variety of system batch and sortation control commands which are employed by the system being described. The system control commands include a listing of system commands for status reports which is identified by the command HELP entered in keyboard 43 to generate a listing of available reports on CRT 42.

By entering the command ERROR a system error report is generated by printer 38 which permits the operator to visualize the number of missorts and transfer failures and take corrective action. Another system control command is RESET which is employed by the operator for resetting error counts which may correspond to missorts where an item is discharged to the wrong discharge chute 52 inadvertently, or transfer failures where the PSC computer fails to divert an article to any of the desired discharge chutes. The final system control command is the time setting function which is employed to provide a real time display or printout to all of the various reports and is entered by entering the command $ T employed by the operator to set the system time.

In addition to the system control commands, there are several batch control commands which are entered by keyboard 43 some of which have been previously discussed. The first of these, is the READ command which effects the reading of the customer's diskette 23 by the DAS computer diskette unit 30 reading the information into the memory 34. The START command starts the batch processing monitor and control while and END command as

previously discussed, ends the batch processing. The WRITE command causes the diskette to be reprogrammed with the updated status of the orders and transactions therein reported back to the main customer computer through a reprogrammed diskette while a DELETE command then is employed to delete the completed batch information from memory 34. The ASSIGN command is employed for example in the event a given product is out of stock and, with the batch processing system, this could affect several transactions associated with several different orders. To provide a quick update of the status of the particular product and therefore the transactions in which it is involved, the operator can assign to the transaction numbers affected a stockout status so that this condition can be instantaneously displayed at any of the report printers or operator terminals once the condition has been reported.

Finally, there are several sortation control commands entered into keyboard 43 to control the sorting of articles. One mode of operation is identified and controlled by the command HOLD. With the HOLD command, the induction station 54 is stopped when a no-read occurs on scanner 44 and the operator must manually scan the label using wand 46 (Figure 1) to read the label. He does that by actuating switch 45 such that the wand 46 output information is supplied to the DAS computer 32. The induction station 54 then restarts, and the article is sorted.

With the RECIRC command, articles with labels not read by scanner 44 are automatically directed to re-

circulation lane 58. Upon initial startup of the system, the command OPEN is employed to open the communications interface 62 between the DAS computer 32, and PSC computer 60. The command REROUTE is employed to assign an alternative sortation line for articles with a common destination contained within all batches being processed. This is employed for example, in the event a sort line 52 has a mechanical failure and it is temporarily shut down. The command RESTORE will automatically reassign rerouted articles not yet processed to the original sort line once it has been repaired.

In addition to the interface between the operator terminal 40 and the system employing the above identified commands, the system will automatically provide two different types of printouts available to management and control personnel for the monitoring and operational control of the system. The first type of printout is provided by the system's operational log printer 36, and provides indications of the status of the system as well as missorts and the like. The following is a typical printout during a short period of time representing a variety of operational conditions of the system.

```
04/01/80 14:30:34 System Started
04/01/80 14:30:46 PSC Communications Line Open
04/01/80 14:30:59 Start of Batch TO2
04/01/80 14:31:04 Hold on Scanner Error
04/01/80 14:31:43 Scanner Error at
                  Induction No. 1 Scanner
04/01/80 14:31:54 Transaction 984561 at
                  Induction No. 1 Scanner Not
                  on File
```

04/01/80 14:32:17 Transaction 411589 at Induction No. 1 Scanner Out of Batch
04/01/80 14:32:44 Sortation Line 1 Full
04/01/80 14:32:49 Transaction 598404 Mis-sorted to Sort Line 3
04/01/80 14:33:24 Unsuccessful Transfer at Sort Line 1 for Transaction 632368
04/01/80 14:33:27 Scanner Error at Induction No. 2 Scanner
04/01/80 14:34:29 Transaction 581419 Has Been Lost From Tracking
04/01/80 14:34:46 Recirculate on Scanner Error
04/01/80 14:35:37 End of Batch T02
04/01/80 14:36:08 Transaction 581419 on Sort Line 2 Not On File
04/01/80 14:36:27 PSC Communications Failure
00/00/00 00:00:10 Power Fail/Restart

As can be seen from the above report, the status of the system and its communications with the PSC is indicated as well as events such as scanning errors at the induction station, sortation lines being full, as detected by the line full photo detector 69 (Figure 1), missorts and the like. This record is automatically printed without a specific operator command such that monitoring personnel can take corrective action as required. Naturally, many of the messages printed simply indicate the status of a particular batch, for example, at 14:30:59, batch T02 was beginning to be processed and at 14:35:37, batch T02

was completed.

The second type of printed information, specifically requested results from the entry of the system control command HELP, which provides a variety of selectable status reports. These reports are called up using keyboard 43 selectively as indicated by the following table:

Schedule	-	Work Schedule Batches
Batch	-	Batch/Order Status
Order	-	Order/Transaction Status
Transact	-	Transaction Status
Missort	-	Missort Exceptions
Route	-	Sort Line Translations

The reports generated by the entry of the commands at keyboard 43 are provided by the report printer 38. An example of a typical order report is shown in Figure 3. Basically each report provides a complete current status of batches being processed by the system, orders included in each batch, and particular transactions included in each order. Further, these reports provide an indication as to the percentage of completion, the number of items which are out of stock, and an indication of items not picked, missorted, or in processing. This information is used by the supervisory personnel to monitor on a regular basis the operation of the picking and sorting system, as well as to provide particular commands through terminal 40 for effecting the efficient operation of the system.

In the event that a stockout condition exists where items to be picked are not available, this information can, as previously indicated, be entered through an operator terminal, but also wand 48 can be employed to

scan the labels which have not been applied to articles to be picked and the system automatically assigns a stockout status to the transactions and permits the batch to be completed noting the stockout status in the batch status report. An additional wand scanner (not shown) is provided for excess labels to cover the situation where incomplete case loads of materials are ordered and the efficiency of the picker in filling the cartons is unknown. To cover this situation, several additional labels are provided in the event that a greater number of cartons are required due to the packing efficiency. In the event these extra labels are not needed, they are scanned by the additional wand scanner to maintain accurate status information as to all labels and therefore all transactions within the system.

With the system which has been described, therefore, high speed article processing can be achieved. A picking and sorting operation for warehouses is provided with a control system for efficiently monitoring the current operational status of a plurality of batch picks each including several orders which, in turn, include several transactions. By assigning to each transaction a unique identifying number which is physically associated with the article to be picked in the form of a machine readable label, and which is entered into the control system memory in the form of stored data, the current status of each transaction, order, and batch can be continuously monitored and controlled. The resultant system results in a more efficiently operated system with a higher throughput than previously achievable through conventional picking systems.

CLAIMS

1. A method of monitoring the operational status of an article processing operation comprising the steps of: assigning an identification number unique to each article to be picked and sorted; supplying a plurality of labels (20), each label including a different one of the unique identification numbers (22, 27); applying one of the labels to each article to be picked and sorted; storing data corresponding to each article including the unique identification number and the sort destination; reading the label on each article as it is inducted onto a sorting line (50); correlating information from the reading step with the stored data to control the sorting of each article to an assigned discharge location coupled to the sorting line; and selectively providing updated information as to the status of each article in the system as a result of the reading and correlating steps.

2. A method as claimed in Claim 1 in which the processing operation is a picking and sorting operation.

3. A method as claimed in Claim 2 in which the storing step comprises the organization of unique identification numbers into batches with each batch including one or more orders destined for one or more sort destinations.

4. A method as claimed in Claim 2 or Claim 3 in which, in the supplying step, the labels are arranged such that identical products with different unique identification numbers are grasped to be picked together.

5. A method as claimed in Claim 2 or Claim 3 or Claim 4 in which the providing step includes the steps of printing reports including status information as to each article or group of articles including whether or not it has been sorted and information as to the completion status for each batch.

6. A method as claimed in any of Claims 2 to 5 in which the assigning step comprises the assigning of a six digit number to each article to be picked and sorted and the supplying step includes the coding of each label with indicia representing said six digit number.

7. A method as claimed in Claim 6 in which the reading step comprises the scanning of each label as an article passes a scanner to detect the indicia representing said six digit number of each label.

8. A system for monitoring the status of articles being processed comprising: means (30) for storing data representing each article moving within the system, the data including a number assigned to each article which is unique to each article; scanning means (44, 46) for scanning indicia (22) including the unique number on an article being processed; computer circuit means (32, 60)

coupled to the data storing means and to the scanning means for correlating position information of each article with the article identification number; and display means (42) coupled to the computer circuit means for providing display information to an operator of the status of articles or groups of articles in the system.

9. A system as claimed in Claim 8 which includes a plurality of labels (20) for attachment to articles to be processed, the labels carrying the indicia.

10. A system as claimed in Claim 8 or Claim 9 which is combined with a warehousing system in which stored articles are to be picked and sorted for despatch.

11. A system as claimed in Claim 10 in which data for each batch of articles to be picked is stored on a recording medium (23) which can be transferred from a central control area to the warehousing system, and which includes data transfer means (30) coupled to the computer circuit means for reading and transferring data from the recording medium to the data storing means.

12. A system as claimed in Claim 10 or Claim 11 in which the display means includes an operator terminal (40) which is coupled to the computer circuit means and which includes a keyboard (43) and CRT display (42) for selectively interrogating the computer circuit means for status information.

13. A system as claimed in Claim 10 or Claim 11 or Claim 12 in which the display means includes printer means (38) coupled to the computer circuit means for providing a printout of the status of articles to be picked and sorted.

14. A system as claimed in Claim 13 in which the display means includes additional printer means (36) for printing alarm messages relating to predetermined events occurring during the operation of said system.

15. A system as claimed in any of Claims 10 to 14 which includes: a sorting conveyor (50) with a plurality of discharge chutes (52); a conveyor control circuit (66) for selectively controlling the discharge of articles onto the discharge chutes; and means (67) coupling the conveyor control circuit to the computer circuit means for controlling the diverting of articles in response to the correlation of their unique identification number with associated sort destination information stored in the data storage means.

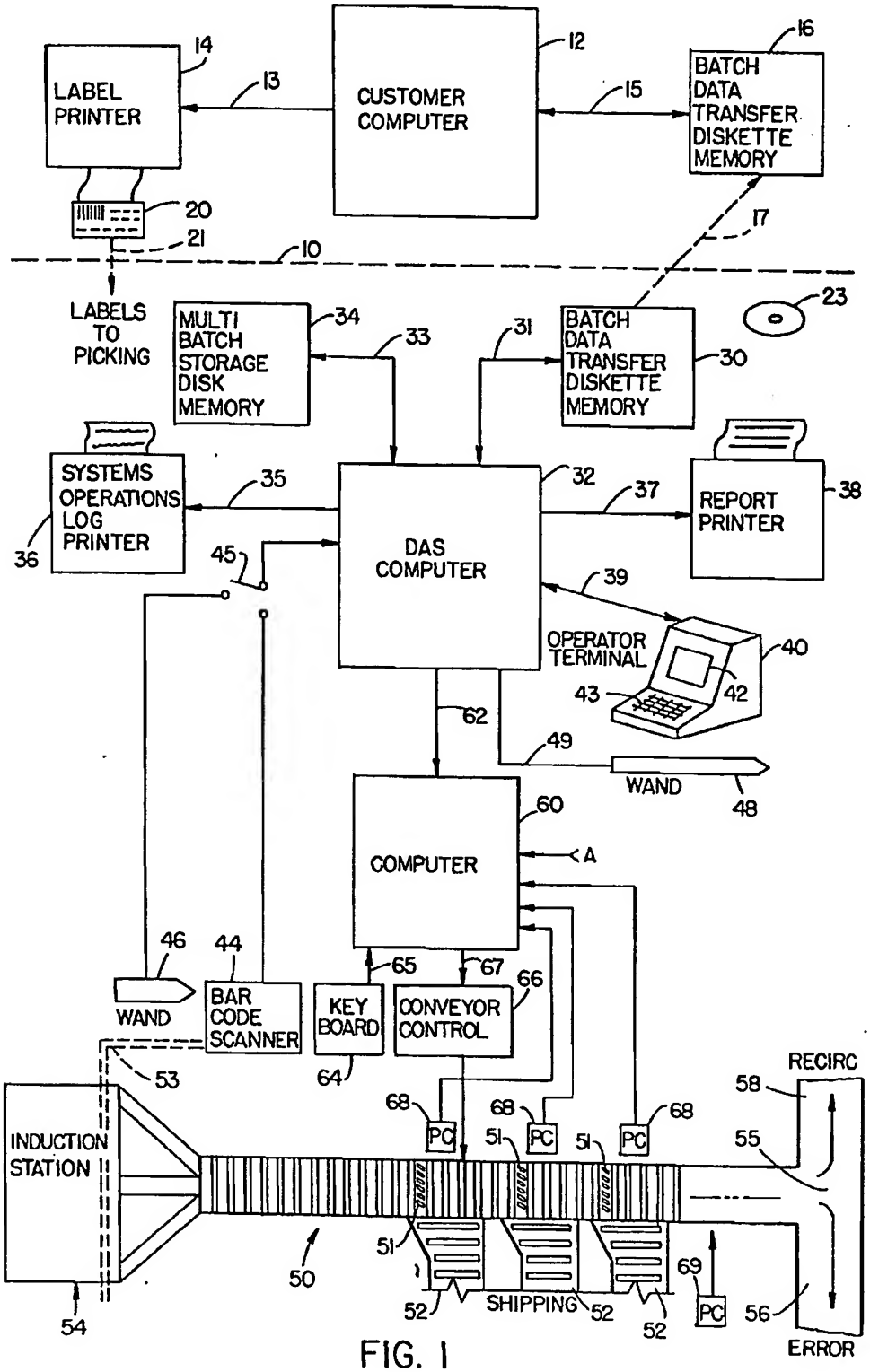
LABEL PRINTER
14
13
CUSTOMER COMPUTER
12
15
BATCH DATA TRANSFER DISKETTE MEMORY
16
17
20
21
10
LABELS TO PICKING
MULTI BATCH STORAGE DISK MEMORY
34
33
31
BATCH DATA TRANSFER DISKETTE MEMORY
30
23
SYSTEMS OPERATIONS LOG PRINTER
35
36
DAS COMPUTER
32
37
REPORT PRINTER
38
45
39
OPERATOR TERMINAL
40
43
42
62
49
WAND
48
COMPUTER
60
A
46
44
65
67
66
WAND
BAR CODE SCANNER
KEY BOARD
CONVEYOR CONTROL
53
64
RECIRC
58
68
PC
51
55
INDUCTION STATION
50
69
54
52
SHIPPING
56
ERROR

FIG. 1

ORDER STATUS REPORT PAGE 2

-- BATCH -- ID.	STATUS	NO. OF ORDERS	NO. OF TRANS.	HEADER INFORMATION
SO1	ACTIVE	3	150	SAMPLE BATCH OF 150 TRANSACTIONS

#	ORDER ID.	QUANTITIES: PLAN	STAGED	NOT SHIP	% COMP.	STOCK -OUT	EXCESS REPACK	IN SORT.	NOT PICKED	MIS-SORT
2	000002	50	35	15	74.0	2	0	4	8	1

- TRANSACTION #	NUMBER	STATUS	PRODUCT IDENTIFICATION	SOURCE LOCATION	DESTINATION
1	113	IN SORTATION	000104	00104	2
2	116	IN SORTATION	000107	00107	2
3	119	IN SORTATION	000110	00110	2
4	122	STOCK-OUT	000113	00113	2
5	125	STOCK-OUT	000116	00116	2
6	128	NOT PICKED	000119	00119	2
7	131	NOT PICKED	000122	00122	2
8	134	NOT PICKED	000125	00125	2
9	137	NOT PICKED	000128	00128	2
10	140	NOT PICKED	000131	00131	2
11	143	IN SORTATION	000134	00134	2
12	149	NOT PICKED	000140	00140	2
13	152	NOT PICKED	000143	00143	2
14	155	NOT PICKED	000146	00146	2
15	158	MIS-SORTED	000149	00149	2 (1)

FIG. 3

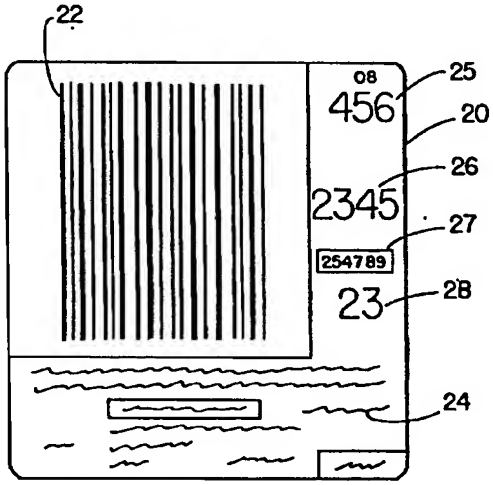

FIG. 2